WHAT IS CLAIMED IS:

1. A non-naturally occurring fusion protein comprising:
a peroxisome targeting protein subunit; and
a polyhydroxyalkanoate synthase protein subunit.

2. The fusion protein of claim 1, wherein the peroxisome targeting subunit is PTS2.

3. The fusion protein of claim 1, wherein the peroxisome targeting subunit comprises a tripeptide, wherein:
the first amino acid in the N-terminus to C-terminus direction is S, A, or P;
the second amino acid in the N-terminus to C-terminus direction is K, R, S, or H; and
the third amino acid in the N-terminus to C-terminus direction is L, M, I, or F.

4. The fusion protein of claim 3, wherein the peroxisome targeting subunit comprises ARM, SRM, SKL, ARL, SRL, PSI, or PRM.

5. The fusion protein of claim 1, wherein the peroxisome targeting subunit is at least 70% identical to SEQ ID NO:14.

6. The fusion protein of claim 5, wherein the peroxisome targeting protein subunit is at least 80% identical to SEQ ID NO:14.

7. The fusion protein of claim 6, wherein the peroxisome targeting protein subunit is at least 90% identical to SEQ ID NO:14.

8. The fusion protein of claim 7, wherein the peroxisome targeting protein subunit is SEQ ID NO:14.

9. The fusion protein of claim 1, wherein the polyhydroxyalkanoate synthase protein subunit is a *Pseudomonas* subunit.

10. The fusion protein of claim 9, wherein the *Pseudomonas* subunit is a *Pseudomonas aeruginosa* subunit.

11. The fusion protein of claim 10, wherein the polyhydroxyalkanoate synthase protein subunit is a PHAC1 subunit.

12. The fusion protein of claim 11, wherein the polyhydroxyalkanoate synthase protein subunit is at least 70% identical to SEQ ID NO:2.

13. The fusion protein of claim 12, wherein the polyhydroxyalkanoate synthase protein subunit is at least 80% identical to SEQ ID NO:2.

14. The fusion protein of claim 13, wherein the polyhydroxyalkanoate synthase protein subunit is at least 90% identical to SEQ ID NO:2.

15. The fusion protein of claim 14, wherein the polyhydroxyalkanoate synthase protein subunit is SEQ ID NO:2.

16. The fusion protein of claim 10, wherein the polyhydroxyalkanoate synthase protein subunit is a PHAC2 subunit.

17. The fusion protein of claim 16, wherein the polyhydroxyalkanoate synthase protein subunit is at least 70% identical to SEQ ID NO:4.

18. The fusion protein of claim 17, wherein the polyhydroxyalkanoate synthase protein subunit is at least 80% identical to SEQ ID NO:4.

19. The fusion protein of claim 18, wherein the polyhydroxyalkanoate synthase protein subunit is at least 90% identical to SEQ ID NO:4.

20. The fusion protein of claim 19, wherein the polyhydroxyalkanoate synthase protein subunit is SEQ ID NO:4.

21. The fusion protein of claim 1, wherein the polyhydroxyalkanoate synthase protein subunit is at least 70% identical to SEQ ID NO:18 or SEQ ID NO:20.

22. The fusion protein of claim 21, wherein the polyhydroxyalkanoate synthase protein subunit is at least 80% identical to SEQ ID NO:18 or SEQ ID NO:20.

23. The fusion protein of claim 22, wherein the polyhydroxyalkanoate synthase protein subunit is at least 90% identical to SEQ ID NO:18 or SEQ ID NO:20.

24. The fusion protein of claim 23, comprising SEQ ID NO:18 or SEQ ID NO:20.

25. A nucleic acid segment encoding a non-naturally occurring fusion protein, the nucleic acid segment comprising:
a nucleic acid sequence encoding a peroxisome targeting protein subunit; and
a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit.

26. The nucleic acid segment of claim 25, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit comprises at least a 6 contiguous nucleic acid sequence from SEQ ID NO:13.

27. The nucleic acid segment of claim 25, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit is at least 70% identical to SEQ ID NO:13.

28. The nucleic acid segment of claim 27, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit is at least 80% identical to SEQ ID NO:13.

29. The nucleic acid segment of claim 28, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit is at least 90% identical to SEQ ID NO:13.

30. The nucleic acid segment of claim 29, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit is SEQ ID NO:13.

31. The nucleic acid segment of claim 25, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit hybridizes to SEQ ID NO:13.

32. The nucleic acid segment of claim 25, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit comprises at least a 6 contiguous nucleic acid sequence from:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

33. The nucleic acid segment of claim 25, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is at least 70% identical to:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

34. The nucleic acid segment of claim 33, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is at least 80% identical to:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

35. The nucleic acid segment of claim 34, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is at least 90% identical to:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

36. The nucleic acid segment of claim 35, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

37. The nucleic acid segment of claim 36, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is:
SEQ ID NO:15; or
SEQ ID NO:16.

38. The nucleic acid segment of claim 25, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit hybridizes to:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

39. The nucleic acid segment of claim 25, wherein the peroxisome targeting protein subunit is PTS2.

40. The nucleic acid segment of claim 25, wherein the peroxisome targeting protein subunit comprises a tripeptide, the tripeptide having:
a first amino acid in the N-terminus to C-terminus direction being S, A, or P;
a second amino acid in the N-terminus to C-terminus direction being K, R, S, or H; and
a third amino acid in the N-terminus to C-terminus direction being L, M, I, or F.

41. The nucleic acid segment of claim 40, wherein the peroxisome targeting subunit comprises ARM, SRM, SKL, ARL, SRL, PSI, or PRM.

42. The nucleic acid segment of claim 25, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes at least a 5 contiguous amino acid sequence from:
SEQ ID NO:2; or
SEQ ID NO:4.

43. The nucleic acid segment of claim 25, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes an amino acid sequence at least about 70% identical to:
SEQ ID NO:2; or
SEQ ID NO:4.

44. The nucleic acid segment of claim 43, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes an amino acid sequence at least about 80% identical to:
SEQ ID NO:2; or
SEQ ID NO:4.

45. The nucleic acid segment of claim 44, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes an amino acid sequence at least about 90% identical to:
SEQ ID NO:2; or
SEQ ID NO:4.

46. The nucleic acid segment of claim 45, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes:
SEQ ID NO:2; or
SEQ ID NO:4.

47. A recombinant vector comprising in the 5' to 3' direction:

a) a promoter that directs transcription of a structural nucleic acid sequence encoding a non-naturally occurring fusion protein, wherein the fusion protein comprises:

i) a peroxisome targeting protein subunit; and

ii) a polyhydroxyalkanoate synthase protein subunit.

b) a structural nucleic acid sequence encoding a non-naturally occurring fusion protein, wherein the fusion protein comprises:

i) a peroxisome targeting protein subunit; and

ii) a polyhydroxyalkanoate synthase protein subunit; and

c) a 3' transcription terminator.

48. The recombinant vector of claim 47, further comprising a 3' polyadenylation signal sequence that directs the addition of polyadenylate nucleotides to the 3' end of RNA transcribed from the structural nucleic acid coding sequence.

49. The recombinant vector of claim 47, further comprising a selectable marker.

50. The recombinant vector of claim 49, wherein the selectable marker is a kanamycin resistance marker, a hygromycin resistance marker, or a herbicide resistance marker.

51. The recombinant vector of claim 47, wherein the promoter is constitutive.

52. The recombinant vector of claim 51, wherein the promoter is CaMV35S, enhanced CaMV35S, FMV, mas, nos, or ocs.

53. The recombinant vector of claim 47, wherein the promoter is inducible.

54. The recombinant vector of claim 53, wherein the promoter is tac, salicylic acid induced, polyacrylic acid induced, safener induced, heat shock promoter, nitrate induced, hormone induced, or light induced.

55. The recombinant vector of claim 47, wherein the promoter is tissue specific.

56. The recombinant vector of claim 55, wherein the promoter is the β-conglycinin 7S promoter, napin promoter, phaseolin promoter, zein promoter, soybean trypsin inhibitor promoter, ACP promoter, stearoyl-ACP desaturase promoter, or oleosin promoter.

57. The recombinant vector of claim 47, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit comprises at least a 6 contiguous nucleic acid sequence from SEQ ID NO:13.

58. The recombinant vector of claim 47, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit is at least 70% identical to SEQ ID NO:13.

59. The recombinant vector of claim 58, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit is at least 80% identical to SEQ ID NO:13.

60. The recombinant vector of claim 59, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit is at least 90% identical to SEQ ID NO:13.

61. The recombinant vector of claim 60, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit is SEQ ID NO:13.

62. The recombinant vector of claim 47, wherein the nucleic acid sequence encoding a peroxisome targeting protein subunit hybridizes to SEQ ID NO:13.

63. The recombinant vector of claim 47, wherein the peroxisome targeting protein subunit is PTS2.

64. The recombinant vector of claim 47, wherein the peroxisome targeting protein subunit comprises a tripeptide, the tripeptide having:

a first amino acid in the N-terminus to C-terminus direction being S, A, or P;

a second amino acid in the N-terminus to C-terminus direction being K, R, S, or H; and

a third amino acid in the N-terminus to C-terminus direction being L, M, I, or F.

65. The recombinant vector of claim 64, wherein the peroxisome targeting subunit comprises ARM, SRM, SKL, ARL, SRL, PSI, or PRM.

66. The recombinant vector of claim 47, wherein the polyhydroxyalkanoate synthase protein subunit is a *Pseudomonas* subunit.

67. The recombinant vector of claim 66, wherein the *Pseudomonas* subunit is a *Pseudomonas aeruginosa* subunit.

68. The recombinant vector of claim 47, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit comprises at least a 6 contiguous nucleic acid sequence from:

SEQ ID NO:1;

SEQ ID NO:3;

SEQ ID NO:15; or

SEQ ID NO:16.

69. The recombinant vector of claim 47, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is at least 70% identical to:

SEQ ID NO:1;

SEQ ID NO:3;

SEQ ID NO:15; or

SEQ ID NO:16.

70. The recombinant vector of claim 69, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is at least 80% identical to:

SEQ ID NO:1;

SEQ ID NO:3;

SEQ ID NO:15; or

SEQ ID NO:16.

71. The recombinant vector of claim 70, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is at least 90% identical to:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

72. The recombinant vector of claim 71, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

73. The recombinant vector of claim 72, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit is:
SEQ ID NO:15; or
SEQ ID NO:16.

74. The recombinant vector of claim 47, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit hybridizes to:
SEQ ID NO:1;
SEQ ID NO:3;
SEQ ID NO:15; or
SEQ ID NO:16.

75. The recombinant vector of claim 47, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes at least a 5 contiguous amino acid sequence from:
SEQ ID NO:2; or
SEQ ID NO:4.

76. The recombinant vector of claim 47, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes an amino acid sequence at least about 70% identical to

SEQ ID NO:2; or

SEQ ID NO:4.

77. The recombinant vector of claim 76, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes an amino acid sequence at least about 80% identical to:

SEQ ID NO:2; or

SEQ ID NO:4.

78. The recombinant vector of claim 77, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes an amino acid sequence at least about 90% identical to:

SEQ ID NO:2; or

SEQ ID NO:4.

79. The recombinant vector of claim 78, wherein the nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit encodes:

SEQ ID NO:2; or

SEQ ID NO:4.

80. The recombinant vector of claim 47, wherein the structural nucleic acid sequence comprises:

SEQ ID NO:17; or

SEQ ID NO:19.

81. The recombinant vector of claim 47, wherein the structural nucleic acid sequence encodes:

SEQ ID NO:18; or

SEQ ID NO:20.

82. A recombinant host cell comprising a nucleic acid segment encoding a non-naturally occurring fusion protein, wherein the nucleic acid segment comprises:
a nucleic acid sequence encoding a peroxisome targeting protein subunit; and
a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit.

83. The recombinant host cell of claim 82, wherein the recombinant host cell is a fungal cell.

84. The recombinant host cell of claim 83, wherein the fungal cell is a *Schizosaccharomyces pombe*, *Streptomyces rimofaciens*, *Fusarium*, *Aspergillus niger*, or *Saccharomyces cerevisiae* cell.

85. The recombinant host cell of claim 82, wherein the recombinant host cell is a plant cell.

86. The recombinant host cell of claim 85, wherein the plant cell is an alfalfa, banana, barley, bean, cabbage, canola/oilseed rape, carrot, castorbean, celery, clover, coconut, corn, cotton, cucumber, linseed, melon, olive, palm, parsnip, pea, peanut, pepper, potato, potato, radish, rapeseed, rice, soybean, spinach, sunflower, tobacco, tomato, or wheat cell.

87. The recombinant host cell of claim 82, further comprising a nucleic acid segment encoding an acyl-ACP thioesterase.

88. The recombinant host cell of claim 82, further comprising a nucleic acid segment encoding a fatty acyl hydroxylase.

89. The recombinant host cell of claim 82, further comprising a nucleic acid segment encoding a yeast multifunctional protein (MFP).

90. The recombinant host cell of claim 82, further comprising a nucleic acid segment encoding a hydroxyacyl-CoA epimerase.

91. A genetically transformed plant cell comprising in the 5' to 3' direction:

a) a promoter to direct transcription of a structural nucleic acid sequence encoding a non-naturally occurring fusion protein, wherein the structural nucleic acid sequence comprises:

i) a nucleic acid sequence encoding a peroxisome targeting protein subunit; and

ii) a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit;

b) a structural nucleic acid sequence encoding a non-naturally occurring fusion protein, wherein the structural nucleic acid sequence comprises:

i) a nucleic acid sequence encoding a peroxisome targeting protein subunit; and

ii) a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit;

c) a 3' transcription terminator sequence; and

d) a 3' polyadenylation signal sequence that directs the addition of polyadenylate nucleotides to the 3' end of RNA transcribed from the structural nucleic acid coding sequence.

92. The genetically transformed plant cell of claim 91, wherein the plant cell is an alfalfa, banana, barley, bean, cabbage, canola/oilseed rape, carrot, castorbean, celery, clover, coconut, corn, cotton, cucumber, linseed, melon, olive, palm, parsnip, pea, peanut, pepper, potato, potato, radish, rapeseed, rice, soybean, spinach, sunflower, tobacco, tomato, or wheat cell.

93. The genetically transformed plant cell of claim 91, further comprising a nucleic acid segment encoding an acyl-ACP thioesterase.

94. The genetically transformed plant cell of claim 91, further comprising a nucleic acid segment encoding a fatty acyl hydroxylase.

95. The genetically transformed plant cell of claim 91, further comprising a nucleic acid segment encoding a yeast multifunctional protein (MFP).

96. The genetically transformed plant cell of claim 91, further comprising a nucleic acid segment encoding a hydroxyacyl-CoA epimerase.

97. A genetically transformed plant comprising in the 5' to 3' direction:

a) a promoter to direct transcription of a structural nucleic acid sequence encoding a non-naturally occurring fusion protein, wherein the structural nucleic acid sequence comprises:

i) a nucleic acid sequence encoding a peroxisome targeting protein subunit; and

ii) a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit;

b) a structural nucleic acid sequence encoding a non-naturally occurring fusion protein, wherein the structural nucleic acid sequence comprises:

i) a nucleic acid sequence encoding a peroxisome targeting protein subunit; and

ii) a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit;

c) a 3' transcription terminator sequence; and

d) a 3' polyadenylation signal sequence that directs the addition of polyadenylate nucleotides to the 3' end of RNA transcribed from the structural nucleic acid coding sequence.

98. The genetically transformed plant of claim 97, wherein the plant is an an alfalfa, banana, barley, bean, cabbage, canola/oilseed rape, carrot, castorbean, celery, clover, coconut, corn, cotton, cucumber, linseed, melon, olive, palm, parsnip, pea, peanut,

pepper, pot[illegible], potato, radish, rapeseed, rice, soybean, spinach, sunflower, tobacco, tomato, or wheat plant.

99. The genetically transformed plant of claim 97, wherein the promoter is constitutive.

100. The genetically transformed plant of claim 99, wherein the promoter is CaMV35S, enhanced CaMV35S, FMV, mas, nos, or ocs.

101. The genetically transformed plant of claim 97, wherein the promoter is inducible.

102. The genetically transformed plant of claim 101, wherein the promoter is tac, salicylic acid induced, polyacrylic acid induced, safener induced, heat shock promoter, nitrate induced, hormone induced, or light induced.

103. The genetically transformed plant of claim 97, wherein the promoter is tissue specific.

104. The genetically transformed plant of claim 103, wherein the promoter is the β-conglycinin 7S promoter, napin promoter, phaseolin promoter, zein promoter, soybean trypsin inhibitor promoter, ACP promoter, stearoyl-ACP desaturase promoter, or oleosin promoter.

105. The genetically transformed plant of claim 97, further comprising a nucleic acid segment encoding an acyl-ACP thioesterase.

106. The genetically transformed plant of claim 97, further comprising a nucleic acid segment encoding a fatty acyl hydroxylase.

107. The genetically transformed plant of claim 97, further comprising a nucleic acid segment encoding a yeast multifunctional protein (MFP).

108. The genetically transformed plant of claim 97, further comprising a nucleic acid segment encoding a hydroxyacyl-CoA epimerase.

109. A method of preparing host cells useful to produce a non-naturally occurring fusion protein comprising the steps of:

a) selecting a host cell

b) transforming the selected host cell with a recombinant vector having a structural nucleic acid sequence encoding a non-naturally occurring fusion protein, wherein the structural nucleic acid sequence comprises:

i) a nucleic acid sequence encoding a peroxisome targeting protein subunit; and

ii) a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit; and

c) obtaining transformed host cells.

110. The method of claim 109, wherein the vector further comprises a selectable marker.

111. The method of claim 110, wherein the selectable marker is a kanamycin resistance marker, a hygromycin resistance marker, or a herbicide resistance marker.

112. The method of claim 109, wherein the host cell is a fungal cell.

113. The method of claim 112, wherein the fungal cell is a *Schizosaccharomyces pombe*, *Streptomyces rimofaciens*, *Fusarium*, *Aspergillus niger*, or *Saccharomyces cerevisiae* cell.

114. The method of claim 109, wherein the host cell is a plant cell.

115. The method of claim 114, wherein the plant cell is an alfalfa, banana, barley, bean, cabbage, canola/oilseed rape, carrot, castorbean, celery, clover, coconut, corn, cotton, cucumber, linseed, melon, olive, palm, parsnip, pea, peanut, pepper, potato,

potato, radish, rapeseed, rice, soybean, spinach, sunflower, tobacco, tomato, or wheat cell.

116. A method of preparing a transformed plant useful to produce a non-naturally occurring fusion protein comprising the steps of:

a) selecting a host plant cell

b) transforming the selected host plant cell with a recombinant vector having a structural nucleic acid sequence encoding a non-naturally occurring fusion protein, wherein the structural nucleic acid sequence comprises:

i) a nucleic acid sequence encoding a peroxisome targeting protein subunit; and

ii) a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein subunit;

c) obtaining transformed host plant cells; and

d) regenerating the transformed host plant cells.

117. The method of claim 116, wherein the vector further comprises a selectable marker.

118. The method of claim 117, wherein the selectable marker is a kanamycin resistance marker, a hygromycin resistance marker, or a herbicide resistance marker.

119. The method of claim 116, wherein the host plant cell is an an alfalfa, banana, barley, bean, cabbage, canola/oilseed rape, carrot, castorbean, celery, clover, coconut, corn, cotton, cucumber, linseed, melon, olive, palm, parsnip, pea, peanut, pepper, potato, potato, radish, rapeseed, rice, soybean, spinach, sunflower, tobacco, tomato, or wheat cell.

120. The plant produced by the method of claim 116.

121. A method for the preparation of a polyhydroxyalkanoate, comprising the steps of:

a) obtaining a cell capable of producing a non-naturally occurring fusion protein, wherein the fusion protein comprises:

i) a peroxisome targeting protein subunit; and

ii) a polyhydroxyalkanoate synthase protein subunit;

b) establishing a culture of the cell; and

c) culturing the cell under conditions suitable for the production of the polyhydroxyalkanoate.

122. The method of claim 121, wherein the culture contains natural fatty acids, non-natural fatty acids, or mixtures thereof.

123. The method of claim 121, wherein the cell is a fungal cell.

124. The method of claim 123, wherein the fungal cell is a *Schizosaccharomyees pombe*, *Streptomyces rimofaciens*, *Fusarium*, *Aspergillus niger*, or *Saccharomyces cerevisiae* cell.

125. The method of claim 121, wherein the cell is a plant cell.

126. The method of claim 125, wherein the cell is an an alfalfa, banana, barley, bean, cabbage, canola/oilseed rape, carrot, castorbean, celery, clover, coconut, corn, cotton, cucumber, linseed, melon, olive, palm, parsnip, pea, peanut, pepper, potato, potato, radish, rapeseed, rice, soybean, spinach, sunflower, tobacco, tomato, or wheat cell.

127. The method of claim 121, wherein the polyhydroxyalkanoate comprises 3-hydroxyhexanoic acid (H:6), 3-hydroxyoctanoic acid (H:8), 3-hydroxydecanoic acid (H:10), 3-hydroxydodecanoic acid (H:12), 3-hydroxytetradecanoic acid (H:14), 3-hydroxyhexadecanoic acid (H:16), 3-hydroxyheptanoic acid (H:7), 3-hydroxynonanoic acid (H9), 3-hydroxyundecanoic acid (H:11), 3-

hydroxytridecanoic acid (H:13), 3-hydroxyhexadecatrienoic acid (H16:3), 3-hydroxyhexadecadienoic acid (H16:2), 3-hydroxyhexadecenoic acid (H16:1), 3-hydroxytetradecatrienoic acid (H14:3), 3-hydroxytetradecadienoic acid (H14:2), 3-hydroxytetradecenoic acid (H14:1), 3-hydroxydodecadienoic acid (H12:2), 3-hydroxydodecenoic acid (H12:1), 3-hydroxyoctenoic acid (H8:1), 4-hydroxydecanoic acid, 8-methyl-3-hydroxynonanoic acid, or 6-methyl-3-hydroxyheptanoic acid monomers.

128. A method for the preparation of a polyhydroxyalkanoate, comprising the steps of:

a) obtaining a plant capable of producing a non-naturally occurring fusion protein, wherein the fusion protein comprises:

i) a peroxisome targeting protein subunit; and

ii) a polyhydroxyalkanoate synthase protein subunit; and

b) growing the plant under conditions suitable for the production of the polyhydroxyalkanoate.

129. The method of claim 128, further comprising supplementing the plant with natural fatty acids, non-natural fatty acids, or mixtures thereof.

130. The method of claim 128, wherein the plant is an alfalfa, banana, barley, bean, cabbage, canola/oilseed rape, carrot, castorbean, celery, clover, coconut, corn, cotton, cucumber, linseed, melon, olive, palm, parsnip, pea, peanut, pepper, potato, potato, radish, rapeseed, rice, soybean, spinach, sunflower, tobacco, tomato, or wheat plant.

131. The method of claim 128, wherein the polyhydroxyalkanoate comprises 3-hydroxyhexanoic acid (H:6), 3-hydroxyoctanoic acid (H:8), 3-hydroxydecanoic acid (H:10), 3-hydroxydodecanoic acid (H:12), 3-hydroxytetradecanoic acid (H:14), 3-hydroxyhexadecanoic acid (H:16), 3-hydroxyheptanoic acid (H:7), 3-hydroxynonanoic acid (H9), 3-hydroxyundecanoic acid (H:11), 3-hydroxytridecanoic acid (H:13), 3-hydroxyhexadecatrienoic acid (H16:3), 3-

hydroxyhexadecadienoic acid (H16:2), 3-hydroxyhexadecenoic acid (H16:1), 3-hydroxytetradecatrienoic acid (H14:3), 3-hydroxytetradecadienoic acid (H14:2), 3-hydroxytetradecenoic acid (H14:1), 3-hydroxydodecadienoic acid (H12:2), 3-hydroxydodecenoic acid (H12:1), 3-hydroxyoctenoic acid (H8:1), 4-hydroxydecanoic acid, 8-methyl-3-hydroxynonanoic acid, or 6-methyl-3-hydroxyheptanoic acid monomers.

132. A plant containing a polyhydroxyalkanoate, wherein the polyhydroxyalkanoate comprises 3-hydroxyhexanoic acid (H:6), 3-hydroxyoctanoic acid (H:8), 3-hydroxydecanoic acid (H:10), 3-hydroxydodecanoic acid (H:12), 3-hydroxytetradecanoic acid (H:14), 3-hydroxyhexadecanoic acid (H:16), 3-hydroxyheptanoic acid (H:7), 3-hydroxynonanoic acid (H9), 3-hydroxyundecanoic acid (H:11), 3-hydroxytridecanoic acid (H:13), 3-hydroxyhexadecatrienoic acid (H16:3), 3-hydroxyhexadecadienoic acid (H16:2), 3-hydroxyhexadecenoic acid (H16:1), 3-hydroxytetradecatrienoic acid (H14:3), 3-hydroxytetradecadienoic acid (H14:2), 3-hydroxytetradecenoic acid (H14:1), 3-hydroxydodecadienoic acid (H12:2), 3-hydroxydodecenoic acid (H12:1), 3-hydroxyoctenoic acid (H8:1), 4-hydroxydecanoic acid, 8-methyl-3-hydroxynonanoic acid, or 6-methyl-3-hydroxyheptanoic acid monomers.

133. A polyhydroxyalkanoate comprising 3-hydroxyhexadecatrienoic acid (H16:3), 3-hydroxyhexadecadienoic acid (H16:2), 3-hydroxytetradecatrienoic acid (H14:3), or 3-hydroxydodecadienoic acid (H12:2) monomers.